



# UNITED STATES PATENT AND TRADEMARK OFFICE

H'D

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
-----------------	-------------	----------------------	---------------------	------------------

10/588,775

08/08/2006

Yasuhiro Okamoto

Q96219

9772

23373 7590 01/02/2008  
SUGHRUE MION, PLLC  
2100 PENNSYLVANIA AVENUE, N.W.  
SUITE 800  
WASHINGTON, DC 20037

EXAMINER
----------

LI, MEIYA

ART UNIT	PAPER NUMBER
----------	--------------

2811

MAIL DATE	DELIVERY MODE
-----------	---------------

01/02/2008

PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	Application No. 10/588,775	Applicant(s) OKAMOTO ET AL.	
	Examiner Meiya Li	Art Unit 2811	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 09 November 2006.
- 2a) ☐ This action is FINAL.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-8 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-8 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

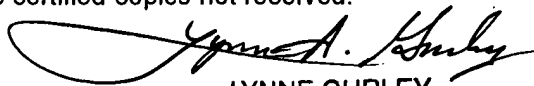
### Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 08 August 2006 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All    b) ☐ Some \*    c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.



LYNNE GURLEY  
SUPERVISORY PATENT EXAMINER  
AU 2811, TC 2800

### Attachment(s)

- |   |  |
|---|--|
| <p>1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)</p> <p>2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)</p> <p>3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)<br/>Paper No(s)/Mail Date <u>8/8/06</u>.</p> | <p>4) <input type="checkbox"/> Interview Summary (PTO-413)<br/>Paper No(s)/Mail Date. _____</p> <p>5) <input type="checkbox"/> Notice of Informal Patent Application</p> <p>6) <input type="checkbox"/> Other: _____</p> |
|---|--|

## **DETAILED ACTION**

### ***Priority***

1. Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

### ***Information Disclosure Statement***

2. The information disclosure statement (IDS) submitted on August 8, 2006 is in compliance with the provisions of 37 CFR 1.97. Accordingly, the information disclosure statement is being considered by the examiner.
3. The listing of references in the specification is not a proper information disclosure statement. 37 CFR 1.98(b) requires a list of all patents, publications, or other information submitted for consideration by the Office, and MPEP § 609.04(a) states, "the list may not be incorporated into the specification but must be submitted in a separate paper." Therefore, unless the references have been cited by the examiner on form PTO-892, they have not been considered.

### ***Drawings***

4. Figures 1-3 should be designated by a legend such as --Prior Art-- because only that which is old is illustrated. See MPEP § 608.02(g). Corrected drawings in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. The replacement sheet(s) should be labeled "Replacement Sheet" in the page header (as per 37 CFR 1.84(c)) so as not to obstruct

any portion of the drawing figures. If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

### ***Specification***

5. The disclosure is objected to because of the following informalities: Undefined acronyms, such as "SiON" on page 7, line 1. The examiner suggests that applicant spell out all the acronyms when using them for the first time in the specification.
6. The disclosure is objected to because of the following informalities: Typo error. Adding a space in between "SiO<sub>2</sub>" and "film" on page 7, line 2 is suggested.
7. The specification has not been checked to the extent necessary to determine the presence of all possible minor errors. Applicant's cooperation is requested in correcting any errors of which applicant may become aware in the specification.

### ***Claim Objections***

8. Claims 1-8 are objected to because of the following informalities:
9. In claim 1, line 8, the phrase "thickness of a portion of said insulating film" is informal. Changing to the phrase "a thickness of a portion of said insulating film" is suggested.
10. In claims 5-8, line 1, the phrase "any one of claims 1" is informal. Changing to the phrase "claim 1" is suggested.
11. Typo errors in claims 6 and 7, changing "SiO<sub>2</sub>" to "SiO<sub>2</sub>" are suggested.
12. Appropriate correction is required.

***Claim Rejections - 35 USC § 112***

13. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

14. Claims 1-8 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

15. Claim 1 recited the limitation "characterized" on line 5, is unclear as to which structure is characterized.

16. Claim 1 recited the limitation "projects to" on line 6, is unclear how does the field plate portion project to the drain electrode.

17. Claims 3 (and 4) recite the limitation "a thickness of a portion of said insulating film", is unclear which thickness of a portion of said insulating film is being referenced in claim 1 – the thickness of a portion of said insulating film in line 8 or an additional unclaimed thickness of a portion of said insulating film.

***Claim Rejections - 35 USC § 103***

18. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

19. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

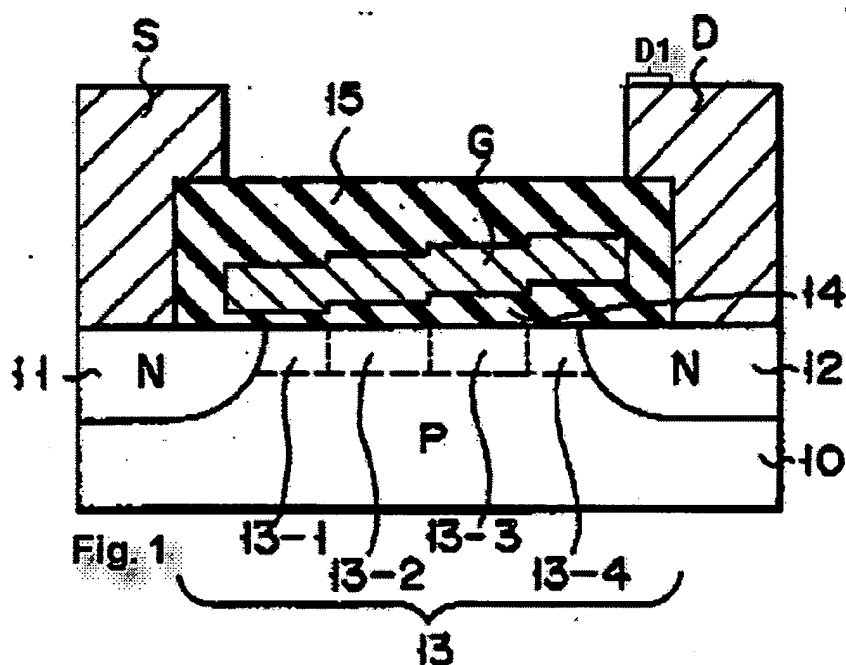
20. Claims 1-4 and 6-8, as best understood, are rejected under 35 U.S.C. 103(a) as being unpatentable over Shur et al. (Pub. # US 2005/0087752 A1, published on April 28, 2005, filed on October 26, 2004, Prov. filed on October 27, 2003) in view of Shirai (Pat. # 5,422,505, patented on June 6, 1995).

As for claim 1, Shur et al. shows (Fig. 5) a field effect transistor 220 comprising a III group nitride semiconductor layer structure 212/214 including hetero junction ([0025], lines 6-8 and 15-17; [0033], lines 5-6), a source electrode 224 and a drain electrode 226 that are so formed on said semiconductor layer structure 214/212 as to be separated each other, a gate electrode 222/230 formed between said source electrode 224 and said drain electrode 226, and an insulating film 218 formed on said semiconductor layer structure 214/212, characterized in that said gate electrode 222/230 has a field plate portion 230 that projects to said drain electrode 226 in the form of an eave and that is formed on said insulating film 218.

However, Shur et al. fails to show a thickness of a portion of said insulating film lying between said field plate portion and said semiconductor layer structure gradually increases from said gate electrode toward said drain electrode.

In the same field of endeavor, Shirai teaches a thickness of a portion of the insulating film 14 lying between the field plate portion G and said semiconductor layer structure gradually increases from the gate electrode toward the drain electrode (Fig. 1).

It would have been obvious to one of ordinary skill in the art, at the time the invention was made, to include the thickness of a portion of the insulating film lying between the field plate portion and the semiconductor layer structure gradually increases from the gate electrode toward the drain electrode, as taught by Shirai, in the device of Shur et al., with the motivation to improve the current driving ability of the device.



As for claim 2, said semiconductor layer structure 214/212 has an AlGaIn/GaN hetero structure (Shur: [0025], lines 6-8 and 15-17).

As for claim 3, a thickness of said portion of said insulating film varies stepwise (Shirai: Fig. 1).

As for claim 4, a thickness of said portion of said insulating film varies continuously (Shirai: Fig. 1).

As for claim 6, said insulating film 218 is a SiO<sub>2</sub> film or a SiN film (Shur: [0029], lines 8-9).

As for claim 7, said insulating film is a laminated layer of a SiO<sub>2</sub> film and a SiN film (Shur: [0029], lines 8-9).

As for claim 8, a drain field plate electrode D2 connected to said drain electrode D is arranged on said insulating film 14 between said gate electrode G and said drain electrode D (Shirai: Fig. 1).

21. Claims 1-5 and 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Martinez et al. (Pub. # US 2003/0235974 A1, published on December 25, 2003, filed on June 25, 2002) in view of Shirai (Pat. # 5,422,505, patented on June 6, 1995).

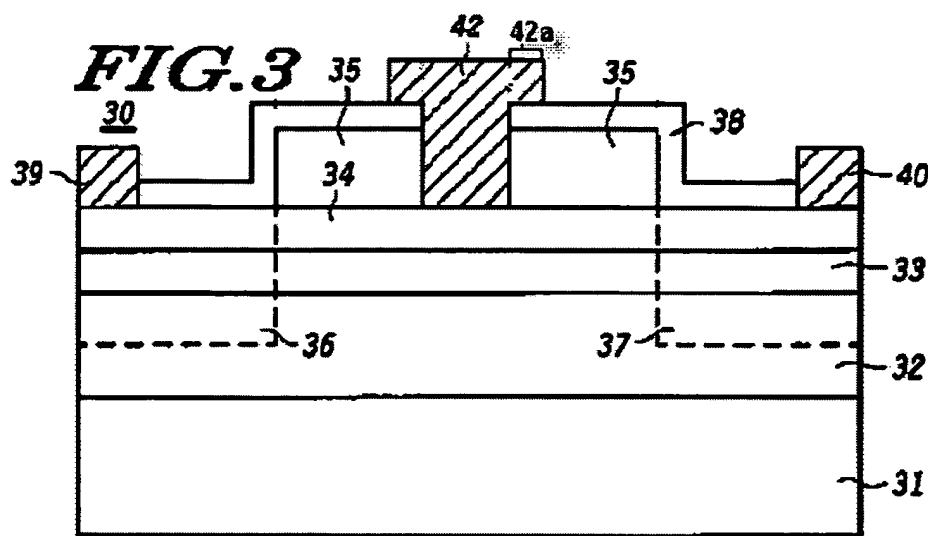
As for claim 1, Martinez et al. show (Fig. 3) a field effect transistor 30 comprising a III group nitride semiconductor layer structure 32/33/34 including hetero junction ([0016], line 2; [0030], line 23-25), a source electrode 39 and a drain electrode 40 that are so formed on said semiconductor layer structure 32/33/34 as to be separated each other, a gate electrode 42 formed between said source electrode 39 and said drain electrode 40, and an insulating film 38 formed on said semiconductor layer structure 32/33/34, characterized in that said gate electrode 42 has a field plate portion 42a that projects to said drain electrode 40 in the form of an eave and that is formed on said insulating film 38.



However, Martinez et al. fails to show a thickness of a portion of said insulating film lying between said field plate portion and said semiconductor layer structure gradually increases from said gate electrode toward said drain electrode.

In the same field of endeavor, Shirai teaches a thickness of a portion of the insulating film 14 lying between the field plate portion G and said semiconductor layer structure gradually increases from the gate electrode toward the drain electrode (Fig. 1).

It would have been obvious to one of ordinary skill in the art, at the time the invention was made, to include the thickness of a portion of the insulating film lying between the field plate portion and the semiconductor layer structure gradually increases from the gate electrode toward the drain electrode, as taught by Shirai, in the device of Martinez et al., with the motivation to improve the current driving ability of the device.



As for claim 2, said semiconductor layer structure 32/33/34 has an AlGaIn/GaN hetero structure (Martinez: [0030], lines 23-25).

As for claim 3, a thickness of said portion of said insulating film varies stepwise (Shirai: Fig. 1).

As for claim 4, a thickness of said portion of said insulating film varies continuously (Shirai: Fig. 1).

As for claim 5, said insulating film 38 is a SiON film (Martinez: [0017], line 1).

As for claim 8, a drain field plate electrode D1 connected to said drain electrode D is arranged on said insulating film 14 between said gate electrode G and said drain electrode D (Shirai: Fig. 1).

### ***Conclusion***

22. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Ref's B-D are cited as being related to field effect transistor.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Meiya Li whose telephone number is (571) 270-1572. The examiner can normally be reached on Monday-Friday 7:30AM-5:00PM Eastern Standard Time.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Lynne Gurley can be reached on (571) 272-1670. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

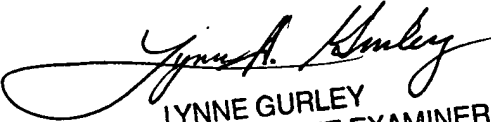
Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR.

Application/Control Number:  
10/588,775  
Art Unit: 2811

Page 10

Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

ML  
12/10/2007

  
LYNNE GURLEY  
SUPERVISORY PATENT EXAMINER  
AU 2811, TC 2800